

#### ABSTRACT OF THE DISCLOSURE

A semiconductor device according to the invention includes: a semiconductor layer (10-15); a gate insulator (16) provided on the semiconductor layer; a gate electrode (17) provided on the gate insulator; a source region (20a) and a drain region (20b), which are of a first conductivity type and are provided in the semiconductor layer on both sides of the gate electrode in plan view; a cap layer (25), a channel region (24), and an under-channel region (23,22), which are of a second conductivity type and are provided in the semiconductor layer between the source region and the drain region in a descending order from an interface with the gate insulator; and a bias electrode member ( $V_{bs}$ ) for applying a voltage to the under-channel region, wherein the channel region is formed of a first semiconductor, the cap layer and the under-channel region are formed of a second semiconductor and a third semiconductor, respectively, each of which has a larger band gap than the first semiconductor, the bias electrode member is capable of applying the voltage independently of the gate electrode.